29. Locally, the radio station WWWV broadcasts at 97.5 MHz (97.5 x 10^6 Hz). Radio waves are electromagnetic waves like light. The waves travel at the speed of light. What is the wavelength of WWWV’s wave length?

30. X-Rays have a wavelength of 1.00 x 10^{-10} m. What is the x-rays frequency?

31. Microwave ovens have a frequency of 2.457 x 10^{10} Hz. What is the wavelength of this microwave?

32. What is the energy of 12 photons from a microwave oven?

33. Visible red light has a wavelength of 0.680 nm. What is the energy of a photon from this light?

34. A beam of light travels through a piece of plastic at 2.97 x 10^8 m/s. What is the index of refraction of this plastic?

35. A beam of light with a frequency of 624 x 10^9 Hz travels through a fluid with an index of refraction of 1.44. How fast is the light traveling through the fluid?

36. A beam of light travels through a dense sodium vapor at 260.00 m/s. What is the index of refraction of the sodium vapor?

37. A beam of light travels through a piece of plastic with an index of refraction of 1.85. What is the wavelength of this light in the plastic if its frequency in a vacuum is 760 nm?

38. A beam of light has a wavelength of 0.950 mm while in a diamond (n=2.48). What is the energy of a single photon in the diamond?

39. A photon travels through a piece of plastic with 6.63 x 10^{-23} J of energy. What is the wavelength of light if the index of refraction is 1.49?

40. A beam of light is incident on cubic zirconia. Draw the refracted ray and calculate its refraction angle.

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41. A beam of light is incident on cubic zirconia. Draw the refracted ray and calculate its refraction angle.

42. A beam of light is incident on crown glass as shown. Draw the refracted ray and calculate its refraction angle.

43. What is the condition(s) for total internal reflection?

44. What is the critical angle for the situation shown below?